

Making sense of Gender and ICTs in Education: Exploring theoretical explanations for complex findings.

Cheryl Brown and Laura Czerniewicz
University of Cape Town

Abstract

This paper examines findings from two surveys of 10110 university students conducted in South Africa in 2004 and 2007. We report on the differences between male and female students access to and use of ICTs for learning. In particular we note that whilst equal opportunities do largely exist for both genders, there are subtle differences in terms of female students practical access and sense of personal agency. Findings about use are complicated with male students using ICTs more frequently particularly in the sciences disciplines and for activities such as information seeking and communication (in contrast to research elsewhere). In order to try and better understand our findings we explore four different theoretical perspectives namely; Bourdieu's notion of habitus; Feminist Standpoint Theory; Critical Information Systems Theory; and Expectations States Theory. We then suggest using Bourdieu's notion of habitus as we believe it offers us the most flexibility whilst enabling a gender focus to be maintained,.

Introduction

Research findings about gender differences and ICT access and use are complex and contradictory. While only a decade ago researchers were united about gender difference with regards to ICT access and use, recent discussions about gender divides are less emphatic, but more varied. Although more studies are now reporting no gap between men and women with regards to ICT use in education ([Rice and Katz 2003](#); [Pejout 2004](#); [Wasserman and Richmond-Abbott 2005](#)), others are noting that differences continue to exist, but more subtly than was previously the case ([Gunn 2003](#); [Enoch and Soker 2006](#)).

Our challenge is therefore to make sense of the more complex findings which have emerged from our research over the past five years in South African higher education institutions ([Czerniewicz and Brown 2006](#); [Brown and Czerniewicz 2008](#)). Rather than a digital divide, our findings suggest a digital differentiation with growing and differing patterns of usage of ICTs for learning between male and female students. These differences appear to be context-dependent (particular types of activities and across different language groups) and more noticeable in the science disciplines. This suggests that gender and ICT use cannot be isolated and need to be considered in tandem with individuals' "life histories" and specific clusters of circumstances.

The research being considered in this paper comprises two surveys (one across six universities in 2004 and another across a different six universities in 2007). These twelve institutions represent the range of institutional types within the South African higher education sector.

In this paper we present our data regarding gender, access and use of ICTs and then consider theoretical explanations for our findings. We suggest that one theoretical framework – Bourdieu's notion of habitus - is especially useful for addressing and further researching the complex issues arising from the evidence.

The study

The project as a whole is best described as having adopted a mixed-method approach, as described by [Creswell \(1994\)](#). This approach was based on the need to collect baseline information across a wide group as well as to move beyond fact gathering to a multi-layered understanding of the issues of access and use for students in the study. It also allowed us to deepen the investigation even at the early "broad brushstroke" phase of the work. Our quantitative statistical analysis has been both descriptive and exploratory and we used qualitative data from open-ended questions in the primarily quantitative survey to elaborate on survey results. This is a well-established approach in social science research which can "illuminate

quantitative data, reducing the need for speculation or subjective interpretations” on the part of researchers (Selwyn 2000).

Our sample comprised 10110 students mostly undergraduates (88%) of even gender split (53%) and mostly from Business and Commerce disciplines (40%) with students from humanities more dominant in the 2007 survey (37%) compared to the 2004 survey (18%) where respondents were more evenly spread across faculties. The majority of students were under 20 years old although the 2004 survey this was skewed more towards the younger group (57% under 20) compared to the 2007 study (28% under 20). 45% of the respondents indicated they were the first person in their immediate family to go to university. Students spoke a diversity of languages with English being the dominant home language in the 2004 survey (39%) and Afrikaans and isiXhosa dominating the 2007 survey (23% and 20% respectively).

Research findings

In this section we report on our findings regarding gender differences and similarities regarding ICT access and use. We also compare our findings wherever possible with the international literature.

Access

When we investigated the differences in access between male and female students in 2004, we found that overall they had the same access to physical resources both on and off campus. However, when considering levels of practical access we found that males have more autonomy of access with 26% of male students having sole access to a home computer compared to 18% female students (Czerniewicz and Brown 2006). We found no other large differences in terms of sharing of computers nor having enough time to use them. In terms of personal agency, we found differences in the self-rating of knowledge and skills, with 26% of male students rating their ability as excellent compared to 15% of females students. There were also difference in relation to levels of experience, with 24% male students reporting having more than 10 years experience with computers compared to 19% female students. We also noted increased levels of technological interest amongst male, as 18% more males than females agreed that they had a high level of technological interest.

Whilst male and female students both said they had access to social networks and support, their strategies were different. Females more often looked for help from family whilst males tended to problem-solve them. Females also more frequently said that institutional support for using ICTs was inadequate.

The 2007 survey saw few changes. Again, more female students indicated they were not the primary or main user of the computer they used off campus (67% compared to 38% males). Fewer female students rated their ability using ICTs generally as excellent (39% compared with 60%) although when asked about their ability using ICTs specifically for academic work an equal number of male and female students indicated they were excellent. On the lower end of the spectrum a larger number of female students indicated their skills and knowledge in this area were poor (62% compared to 37%). No differences were noted in terms of whom male and female students drew on for support. Female students once again were in the majority in their view that institutional support for using ICTs was poor (64% female compared to 35% male). Also, terms of ICTs for social/ recreational activities, female students reported spending less time on personal activities (xx compared to only 36% of male students).

Certainly in terms of access to technological resources ICTs appears to have equalized between genders. This is consistent with Johnson (Johnson 2005) who also notes that motivation and access were equal amongst boys and girls thus creating equal opportunities for use. However despite this equity of access differences in use are still apparent in some contexts.

Gender and use for teaching and learning

In the 2004 survey we did not note any difference between genders with regard use for teaching and learning in general. But male students reported more frequent daily use of computers for study (49% compared to 40% females); and more male students said they used computers to access information (although this wasn't necessarily in terms of their studies) (51% males compared to 39% females daily).

In 2007 we also noted that overall, female students' use of ICTs for academic activities was lower than male students (57% report below average use compared to 50% of male students). This is not unique to our context. Lower frequency of use by women has been reported in Australia where female students showed a lower use of the web compared to their male counterparts (Kennedy, Krause et al. 2006). While these researchers interpreted this as an "engendered digital divide"(Kennedy, Krause et al. 2006) it is also possible that the differentiation is one of preferences (Van Dijk and Hacker 2003b)..

Gender use and disciplines

Given the gender differences we observed for academic use, we explored disciplinary differences and noted that the difference in use between male and female students is amplified in the Sciences where 54% of female students have a below average use compared to 42% of male students. The literature explains the general lack of participation of women in the sciences (Sorenson 2002) but not why women in a particular discipline might consistently use less technology than women in other disciplines. The "exclusivity of networks" and the "lack of support for women" in the sciences may provide useful pointers here and warrant further investigation (Sorenson 2002).

Table 1: Comparison of Discipline and gender and use of ICTs overall

		below average use	above average use	(n)
Business	Male	51%	49%	609
	Female	51%	49%	723
Humanities	Male	56%	44%	383
	Female	64%	36%	688
Science	Male	42%	58%	261
	Female	54%	46%	223

Gender and specific types of activities

We also noted in the 2007 study that the differences in frequency of use were least marked when using ICTs for finding or sharing information. In fact, this is the only aspect of use where female students sometimes showed more frequent activity than male students (with 10% more female students saying they often search for information online and 11% more female students saying they search for lectures notes and presentations). In all other areas, female students reported using ICTs less frequently than males, emphatically so in the sciences.

A striking finding in this study is that male students have consistently reported using ICTs more frequently for communication than women do, in stark contrast to findings from elsewhere (Kennedy, Wellman et al. 2003; Li and Kirkup 2007). Male students report emailing lecturers, communicating with other students as part of their courses and participating in online discussion more frequently than female students do. In the sciences the differential is as wide as 23%.

The increased frequency of use of ICTs by male students for adaptive media (what %??) forms such as tests, tutorials and games and productive media forms such as development and design

using specialised software is less surprising as literature does point towards more frequent use of ICTs for fun, games and recreation by men (Barraket and Scott 2001; [McCoy and Heafner 2004](#)).

Gender and language

Gender differences were further complicated when we observed that differences in use differed between language groups, with Afrikaans-speaking male students having a much higher use compared to Afrikaans female students (19% more were above average users of ICTs) and 13% more English speaking male students having an above-average use. There was little difference in use between Sotho and Setswana speaking male and female students whilst amongst Sotho speaking students 10% more female students were above average users.

Table 2; Differences between above and below average users compared by gender and home language

Language group		below average use	above average use	(n)
Afrikaans	Male	44%	56%	361
	Female	63%	37%	357
English	Male	51%	49%	196
	Female	64%	36%	287
Setswana	Male	49%	51%	190
	Female	45%	55%	179
Sotho	Male	47%	53%	175
	Female	37%	63%	241
Xhosa	Male	68%	32%	228
	Female	69%	31%	401
Grand Total		55%	45%	

Comment on findings

The findings show some interesting discrepancies. On the one hand there are numerous areas where no gender differences are evident (for example technological access). On the other hand, a closer look reveals subtle, unexpected findings (in relation to practical access and differences of use within disciplines). Especially interesting are those examples which contradict the evidence from elsewhere (for example more frequent use of ICTs for communication by male students).

These contradictions and complexities suggest that this issue might be highly context dependent. We need to understand and to be able to answer two inter-related questions. Firstly, why is it that amongst South African Higher Education students we see no gender differences in some circumstances and notable gender differences in use in others? Secondly, which other factors intersect with gender experiences? There are indications from both the data and the broader literature (Frimpong Kwabong 2009) that gender differences intersect with and need to be interpreted together with other factors such as socio-economic group, language, culture and discipline.

While we can speculate on the reasons for these differences, we can also turn to theoretical explanations, both to provide a lens for our findings to date and to provide a framework for further investigations based on the research so far.

Theoretical explanations

Empirical data is more useful if explanatory and predictive principles can be extracted from it. This would allow us to make generalizations at the level of abstractions which transcends the very specific local contexts. Identifying a useful theory would both illuminate and shape our intellectual explorations. Thus an appropriate theory would offer us a set of “interrelated

constructs, definitions and proposition that present a systematic view” of what we are observing (Kezar 2006). In addition, theoretical explanations would useful assist in the focus of further research investigations (Mitchell and Jolley 2004).

For these reasons, we selected four theories from different disciplinary contexts to consider. In particular we were looking for a social theory given that social structures are an obviously dimension in our research and a theory which enables consideration of both structure and agency. We also preferred a theory which had already been used to examine issues of gender and ICTs¹. In particular we reviewed Bourdieu’s notion of habitus (Bourdieu 1990) as it has been used to understand gender differences (McNay 1999; Kvasny 2005); Feminist Standpoint Theory (Ratliff 2006; Nsibirano 2008); Critical Information Systems research on frameworks of power (Trauth and Howcroft 2006); and Expectations States Theory (Adibifar 2007).

We examine what each theory has to offer in terms of explaining gender relationships with ICTs and which aspects of our data the theories illuminate respectively.

Expectations state theory

Drawn from organisational psychology and most frequently based on quantitative data, expectations states theory is based on the premise that individuals conform to societal expectations of performance based on their gender (Balkwell 1991). For example, if males are expected to be better at using computers then the “status characteristics” (the term used by this theory to describe gender, age, skills, experience) of gender are relevant to their personal expectation of their computer ability.

It is applied most often to team work in organizations where the relationship between expectations and performance are examined. It has also been used to understand gender stereotypes in society, for example differential wages between men and women in Israel (Moore 2006) and gender differences in students perceptions of the use of ICTs (Adibifar 2007). It appears that the main usefulness of this theory in our context is the broadening of focus beyond “just gender” to incorporate other aspect of an individual’s background namely age, access, skills and experiences. And whilst it is based on assumptions about “widely held societal perceptions” (Balkwell 1991), it is flexible enough to be able to examine differences between differences in these societal perceptions between different cultural groups” (Moore 2006). In many ways this is similar to self-fulfilling prophecy theories as there is evidence that expectations from others influences behavior, which in turn influence individuals’ achievements.

Critical IS theory

The focus of Critical IS theory is not merely an attempt to describe or observe gender differences or document how they come about but is a way of investigating why an inequality exists, and to search for underlying causes. This moves the research away from an exclusive focus on individuals, situations and local meanings to the systems of relations which make the meaning possible (Trauth and Howcroft 2006). Thus attention is focused on power relations, marginality and dominant discourses in a broader organisational and societal context. Critical IS theory has explicitly been used to understand issues related to women and IT: for example, women’s recruitment and retention in the IT field (Trauth and Howcroft 2006), and the digital divide amongst women minorities (Trauth, Kvasny et al. 2007). It seeks examples of individuals’ overt and covert power plays as well as indications of resistance, solidarity and support, thereby illustrating how people are challenging and transforming what is taken for granted.

¹ We are cognisant of the complexities of defining theory and are not attempting in this paper to situate this in terms of their theoretical characteristic eg levels or types and acknowledge that in some case we may be considering a meat theory (critical theory) versus a grand theory (feminist theory) or a causal theory versus an explanatory theory or whether its empirically driven or conceptually driven (Kezar, 2006).

Critical IS theory is useful in terms of our data in that it enables the examination of female students' agency in terms of power and actively provides a way understanding how people step beyond their constraints.

Feminist standpoint theory

Standpoint theories view the world from the position, point of view or insights of an individual. According to this approach, a person's standpoint influences how people construct their world socially, and is influenced by the social groups a person is a member. Standpoints are therefore different between different social groups. Feminist standpoint theory's starting point of enquiry is women's experiences and its based on the assumption that women's lives and roles in society are different to that of men's; because of their sociological position in society women see things differently. It has been used by (Kvasny 2006) as a lens for unpacking African-American women's use of ICTs and by Clegg as a way of looking at gendered meanings in the relationship between education and computing (Clegg 2001). It is useful for our research in that it illuminates women's interests and needs, their experiences and their situated knowledge.

Bourdieu's theory of habitus

Bourdieu's notion of habitus encompasses a set of dispositions that are learned over one's life history and which mediates and guides individuals' practices. Its application to gender issues has been contested. While Bourdieu used the notion of habitus to understand gender divisions in his book, he has been criticized by feminists for not foregrounding gender domination and for not acknowledging the women's movement in his research. Some researchers have criticised habitus for being an unchanging, "obstinate" set of dispositions (McNay 1999; Thapan 2006). Recently habitus has been adapted to understand gender identity (Laberge 1995; Johnson 2005), to explore the specific experiences of African - American women using ICTs (Kvasny 2005) and to unpack gender and mobile learning (Taylor). Its value in terms of our data is that it provides a multi-faceted way of exploring several dimensions: power relations, social status and economically opposed structures; individuals' past experiences and life histories; and taken-for-granted cultural assumptions.

Determining a theoretical option

This review shows that all of these theoretical perspectives would be useful in understanding gender and ICT issues in our developing country context, we find that States Expectations Theory and Feminist standpoint theory both have as their point of departure a fixed notion of a particular way in which women view the world. Also whilst gender has and will be a focus of our future research we situate our gender enquiry within a broader framework of students (both male and female)'s access to and use (or non-use) of ICTs and therefore using a lens such as feminist standpoint theory might exclude or detract from the male students' perspectives. Whilst Critical IS theory offers a useful focus on power relations, this has limitations and would not provide a framework that facilitates an explanation of female students' agency nor explain why some female students might choose to operate within structural/ societal constraints.

Although concerns have been expressed about Bourdieu's notion of habitus for gender inquiry and few people have explicitly used the notion of habitus to investigate the issues surrounding women and ICTs, it does seem that this framework could offer the most flexibility in terms of our overall research aims whilst still enabling illumination of gender specific issues. It is of note that the concept of habitus obviously has some resonance in our field as it appears almost subliminally in the literature by researchers (Johnson 2005; Kress and Pachler 2007); it has been used by new literacy theorists in their work on ICTs. In particular Bourdieu's framework offers us the opportunity to incorporate individuals' contexts; to examine the intersection between gender, socio-economic group and language; to consider how both male and female students experience ICTs; and to include the influence of social backgrounds. It provides a way of examining both individual and collective experiences, it focuses on both the mental and the material, and it also allows for an examination of power relations.

Conclusion

The quantitative phase of the research project described in this paper has lead to questions which can only be addressed by qualitative methods. As this phase of the investigation begins, the theoretical framework can both guide and structure our inquiry. One of the challenges we face is going to be to use habitus as a methodological tool, given that so few researchers have made this link explicit. We are cognisant that the methodological approach may also be one where "method is a manner of asking questions rather than just ideas" (Nash 1999). In order to use habitus as our guiding theory we will need to ensure that we have a research focus broader than the specific focus under study in order to capture both the present and historical contexts of the individual (Reay 2004) as well as being able to investigate the range of preferences and practices that cluster around varied specific sets of circumstances.

References

- Adibifar, K. (2007). Students perceptions of the use of technology: Does students gender make a difference in their perceptions of using technology in teaching? *Electronic Journal of Sociology*: pp.
- Balkwell, J. (1991). From expectations to behavior: an improved postulate for expectations states theory. *American Sociological Review* **56** (June): pp. 355-369.
- Barraket, J. and G. Scott (2001). Virtual equality? Equity and the use of information technology in higher education, Australian Academic and Research Libraries. **32**: pp.
- Bourdieu, P. (1990). *The Logic of Practice*. Cambridge, Polity Press.
- Brown, C. and L. Czerniewicz (2008). *Trends in student use of ICTs in higher education in South Africa*. 10th Annual Conference of WWW Applications, Cape Town.
- Clegg, S. (2001). Theorising the machine: gender, education and computing. *Gender and Education* **13** (3): pp. 307-324.
- Creswell, J. W. (1994). *Research Design: Qualitative and Quantitative Approaches*. United States of America, Sage Publications.
- Czerniewicz, L. and C. Brown (2006). *Gendered access to, and uses of information and communication technologies (ICTs) in South Africa: higher education experiences in the Western Cape*. Ed-Media 2006: World conference in Educational Multimedia, Hypermedia and Telecommunications, Orlando, Florida, Association for the Advancement of Computing in Education.
- Enoch, Y. and Z. Soker (2006). Age, gender, ethnicity and the digital divide: University students' use of web-based instruction. *Open Learning* **21** (2): pp. 99-110.
- Frimpong Kwapong, O. (2009). Comparing knowledge and usage of ICT among male and female distance learners of an endowed and deprived area in a developing country in Africa. *Journal of information technology education* **8**: pp. 1-17.
- Gunn, C. (2003). Dominant or different? Gender issues in computer supported learning. *JALN* **7** (1): pp. 14-30.
- Johnson, N. (2005). Technological efficiency: a new identity category. *Redress* **14** (3): pp. 8-13.
- Kennedy, G., K. Krause, et al. (2006). *Questioning the net generation: A collaborative project in Australian higher education*. Proceedings of the 23rd annual ascilite conference: Who's learning? Whose technology?, ASCILITE.
- Kennedy, T., B. Wellman, et al. (2003). Gendering the digital divide. *IT & Society* **1** (5): pp. 72-96.

- Kezar, A. (2006). To use or not to use theory: Is that the question. *Higher Education: Handbook of theory and research* J. C. Smart. Netherlands, Springer: pp. pp 283-344.
- Kress, G. and N. Pachler (2007). Thinking about the "m" in m'-learning. *Mobile learning: towards a research agenda*. N. Pachler. London, WLE Centre, London Institute of Education: pp.
- Kvasny, L. (2005). The role of habitus is shaping discourses about the digital divide. *Journal of Computer Mediated Communication* **10** (2): pp.
- Kvasny, L. (2006). Let the Sisters Speak: Understanding Information Technology from the Standpoint of the 'Other. *The DATA BASE for Advances in Information Systems* **37** (4): pp. 13-25.
- Laberge, S. (1995). Towards an integration of gender into Bourdieu's concept of cultural capital. *Sociology of sport journal* **12**: pp. 132-146.
- Li, N. and G. Kirkup (2007). Gender and cultural differences in Internet use: A study of China and the UK. *Computers and Education* **48**: pp. 301-317.
- McCoy, L. and T. Heafner (2004). Effect of Gender on Computer Use and Attitudes of College Seniors. *Journal of Women and Minorities in Science and Engineering* **10** (1): pp. 55-66.
- McNay, L. (1999). Gender, habitus and the field: Pierre Bourdieu and the limits of reflexivity. *Theory, Culture and Society* **16** (1): pp. 95-117.
- Mitchell, M. and J. Jolley (2004). Advantages of using theory to generate ideas: pp.
- Moore, D. (2006). Why don't they demand more? Entitlement and work values of religious and secular women and men in Israel. *Journal of applied social psychology* **36** (8): pp. 1924-1960.
- Nsibirano, R. (2008). "*Him and Her*": *Gender differentials in ICT uptake: A critical literature review and research agenda*. emerge 2008 conference, online.
- Pejout, N. (2004). The communication of communication. An illustration: The South African rhetorical promotion of ICTs. *Polittikon* **31** (2): pp. 185-199.
- Ratliff, C. (2006). Feminist Standpoint Theory. *The encyclopedia of gender and information technology* E. Trauth. Hershey, PA, Information Science Publishing: pp. 335-340.
- Reay, D. (2004). It's all becoming a habitus': beyond the habitual use of habitus in educational research. *British Journal of Sociology of Education* **25** (4): pp. 431-444.
- Rice, R. and J. Katz (2003). Comparing internet and mobile phone usage: Digital divides of usage, adoption and dropouts. *Telecommunications Policy* **27**: pp. 597-623.
- Selwyn, N. (2000). Researching computers and education : Glimpses of the wider picture. *Computers and Education* **33**: pp. 93-101.
- Thapan, M. (2006). Habitus, performance and womens experience: Understanding embodiment and identity in everyday life. *Reading Pierre Bourdieu in a dual context*. R. Lardinois and M. Thapan. New Delhi, Routledge: pp. 199-229.
- Trauth, E. and D. Howcroft (2006). Critical empirical research in IS: an example of gender and the IT workforce. *Information Technology and People* **19** (3): pp. 272-292.

- Trauth, E., L. Kvasny, et al. (2007). Conducting Feminist Research in the Information Systems Field. *Advanced Topics in Technology and Human Interaction*. B. Stahl. Hershey, Idea Group Publishing: pp. 1-24.
- [Van Dijk, J. and K. Hacker \(2003b\). The digital divide as a complex and dynamic phenomenon. *The Information Society* **19**: pp. 315-326.](#)
- [Wasserman, I. and M. Richmond-Abbott \(2005\). Gender and the internet: causes of variation in access, level and scope of use. *Social Science Quarterly* **86** \(1\): pp. 252-270.](#)